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SOURCE Tekhnika-Molodezhi, No 8, 1952.SOVIET PRIZE-WINNING TWIST DRILL TECHNOLOGY

[Information on graphics material is appended.]

The output of 160-170 twist drills per automatic per shift at the Moscow Frezer Plant had been considered record productivity until Ruben Grigor'yevich Bagdat'yev was able to obtain a maximum of 200 drills per shift. However, he was still dissatisfied with the low productivity of this method, the tremendous waste in high-speed steel (a drill 10 grams in weight was made from a blank weighing 22 grams), and other related factors. This dissatisfaction prompted Bagdat'yev to search for a new technology in drill production. After a great deal of trial and error, he developed a method of rolling and twisting in the manufacture of twist drills. In May 1941, a laboratory unit was put into operation.

Later, industrial production of twisted drills was started at the Frezer Plant. All went well until the generator broke down. A spare generator was not available and to repair the one which had broken down might have taken a long time. This problem was solved by switching from hot rolling to cold rolling, and from heating rods for twisting by high-frequency current to heating by industrial current with the use of a transformer.   for earlier descriptions of the new technology for drill production.

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The first conveyor line for the production of twisted drills began to operate at the Frezer Plant in 1949. A second line was joined to it in 1950. At present, preparations are being made to put a third line into operation.

The machine tools in both existing lines are arranged according to the constant-flow principle. The raw material, high-speed steel, moves from one operation to the next, in one direction only, until it becomes a drill complete with pressed-in shank and is ready for dispatch to consumers.

One line performs the work of 20 milling automatics. It consists of three rolling mills and one twisting machine. The cost of these four machines is considerably less than the cost of 20 automatic machine tools.

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Where an automatic could put out only 200 drills per shift, the aggregate designed by Bagdat'yev and Yegorov can produce 4,000. About 3,600 drills, 15 millimeters in diameter, could be made from one ton of high-speed steel by the milling method. More than 8,500 drills of like diameter can be made from one ton of steel by the twisting method. This is possible because all of the metal, with the exception of small allowances for grinding the edges and slight trimming of the end of the blank, goes directly into the tool for which it is intended. The saving in raw material reaches 60 percent.

Because of the decreased cost of equipment, almost complete elimination of waste, and increased productivity of the process, the production cost of twist drills has been cut almost in half.

The life of twisted drills is about 15 percent greater than of milled drills. This is possible because a large portion of the toughest part of a blank, which is at the surface, goes into chips during the process of milling flutes.

Either right or left hand twist drills, with any angle of spiral, can be manufactured by the new technology. -- I. Romanovskiy

GRAPHICS MATERIAL AVAILABLE

Requests for copies of, or further information on, the photographs described herein should be addressed to Graphics Register, CIA, by referring to report number and item number.

## 1. Location: USSR, Moscow

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Caption and Description: "New Technology for Drill Production, Somewhat Simplified: (1) Electric Heating of Rod Before Rolling; (2) Rolling of Profile; (3) Twisting the Profiled Rod in a Heated State; (4) Cutting Through the Spiral; (5) Heat Treatment of Twisted Rod; (6) Centerless Grinding on Outer Diameter; (7) Grinding Centers of Both Ends; (8) Grinding the Neck Before Pressing." This illustrates the first eight steps in the new process

Photograph Description: Size,  $2\frac{1}{2}$  x 9 inches; fairly clear; pulp paper

Source: Tekhnika-Molodezhi, August 1952, page 10, left side

Repository of Source Document: CIA

## 2. Location: USSR, Moscow

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Caption and Description: "(9) Cutting off the Shank; (10) Heated Shank in a Die Before Pressing; (10a) Pressing; (10b) Expulsion of Pressed Drill; (11) Turning the Shank Part; (12) Milling the Tang; (13) Polishing the Flutes; (14) Grinding the Working Part of the Tool; (15) Grinding the Taper of the Shank; (16) Grinding the Lip." This illustrates the last eight steps in the new process

Photograph Description: Size,  $2\frac{1}{2}$  x 9 inches; fairly clear; pulp paper

Source: Tekhnika-Molodezhi, August 1952, page 11, right side

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3. Location: USSR, Moscow

Caption and Description: "Rolling Mill for Rolling Drill Profiles."

This photograph shows the rollers and main part of mill

Photograph Description: Size, 3 x 5 inches; fairly clear; pulp paper

Source: Tekhnika-Molodezhi, August 1952, page 10, right side

Repository of Source Document: CIA

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4. Location: USSR, Moscow

Caption and Description: "General View of Twisting Machine."

This illustration shows the drill being twisted

Photograph Description: Size, 3 x 5 inches; fairly clear; pulp paper

Source: Tekhnika-Molodezhi, August 1952, page 11, left side

Repository of Source Document: CIA

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